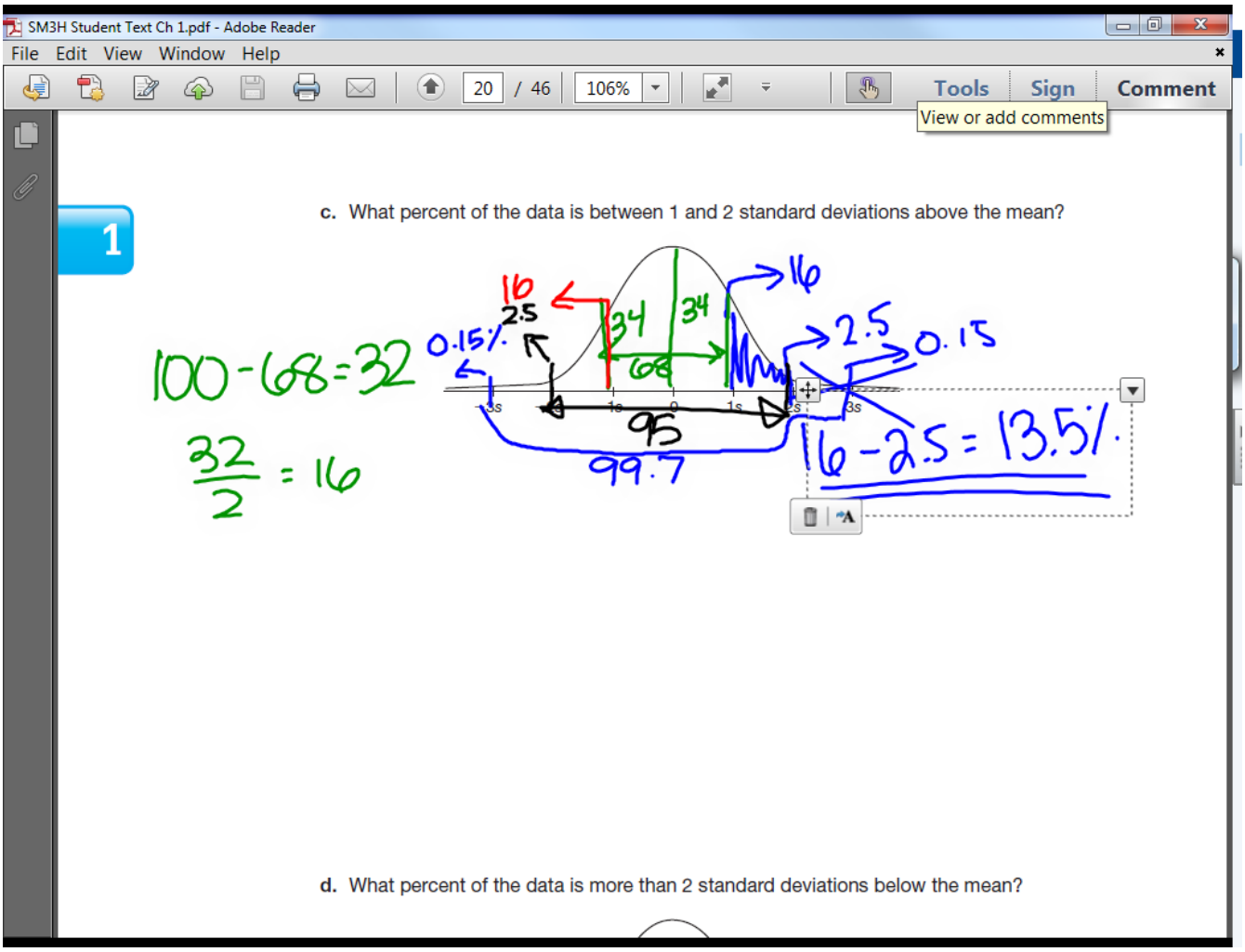
Questions on lesson 1.2?

We will be having our concept mastery quiz shortly.

Feb 27-8:47 AM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1
c. What percent of the data is between 1 and 2 standard deviations above the mean?
100-68=32
32/2 = 16
16
2.5
34
34
16
2.5
0.15
0.15%
68
95
99.7
16-2.5=13.5%
d. What percent of the data is more than 2 standard deviations below the mean?

Sep 4-11:10 AM

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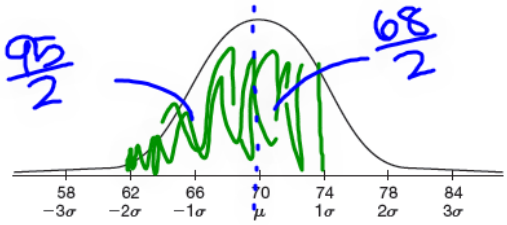
2. Use the normal curve to answer each question and explain your reasoning. Shade the region under each normal curve to represent your answer. Then tell whether the distribution represents population data or sample data.

a. What percent of adult males have a height between 62 inches and 74 inches?

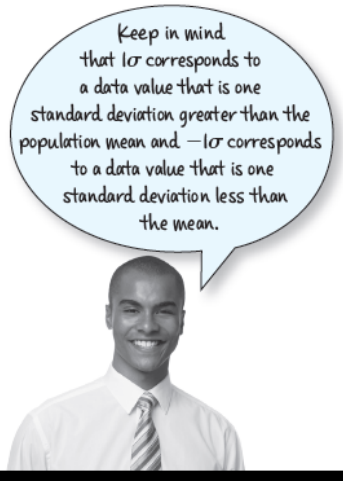


Heights of Adult Males

$\frac{95}{2} + \frac{68}{2} =$

$47.5 + 34 =$

81.5%



Sep 4-11:15 AM

1.3

Below the Line, Above the Line, and Between the Lines

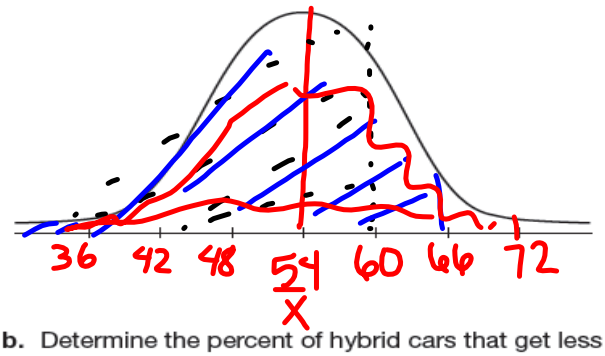
Z-Scores and Percentiles

PAGE 24 IN YOUR BOOK

PROBLEM 1 Off the Mark

1. The fuel efficiency of a sample of hybrid cars is normally distributed with a mean of 54 miles per gallon (mpg) and a standard deviation of 6 miles per gallon.

   a. Use the mean and standard deviation to label the intervals on the horizontal axis of the normal curve in miles per gallon.



   b. Determine the percent of hybrid cars that get less than 60 miles per gallon. Explain your reasoning.

$50 + \frac{68}{2} = 84\%$

   c. Determine the percent of hybrid cars that get less than 66 miles per gallon. Explain your reasoning.

$50 + \frac{95}{2} = 50 + 47.5 = 97.5\%$

   d. Determine the percent of hybrid cars that get less than 72 miles per gallon. Explain your reasoning.

$50 + \frac{99.7}{2} = 99.85\%$

Sep 1-8:11 AM

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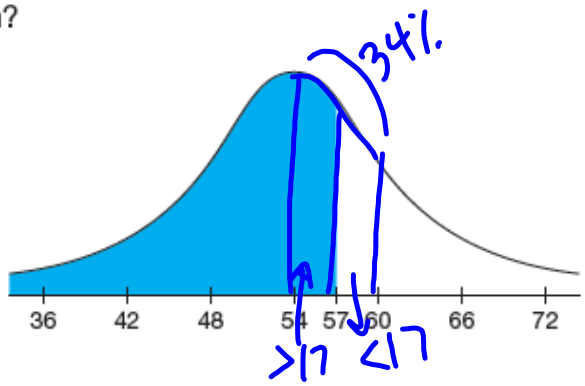
When data values are aligned with integer multiples of the standard deviation from the mean, you can use the Empirical Rule for Normal Distributions to calculate the percent of data values less than that value. But what if a data value does not align with the standard deviations?

2. Let's consider the fuel efficiency of hybrid cars again. The mean is 54 miles per gallon and 1 standard deviation is 6 miles per gallon. What percent of cars get less than 57 miles per gallon?



a. How many standard deviations from the mean is 57 miles per gallon? Explain how you determined your answer.

0.5 standard deviations from the mean.

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The number you calculated in Question 2 is a *z-score*.

A **z-score** is a number that describes a specific data value's distance from the mean in terms of standard deviation units.

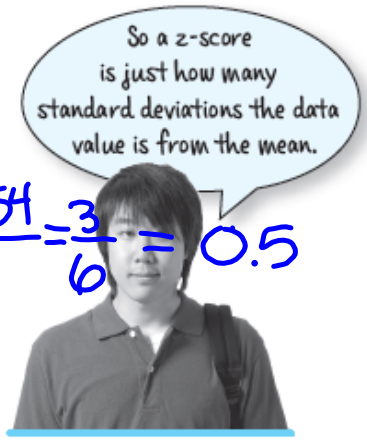
For a population, a *z*-score is determined by the equation

$$z = \frac{(x - \mu)}{\sigma},$$

where x represents a value from the data.

x is the data value
μ is the mean
σ is the standard deviation

$$Z = \frac{57-54}{6} = \frac{3}{6} = 0.5$$



You can use a *z*-score table to determine the percent of data less than a given data value with a corresponding *z*-score. A *z*-score table is provided at the end of this lesson.

To determine the percent of hybrid cars that get less than 57 miles per gallon with a *z*-score table, first calculate the *z*-score for 57 miles per gallon. In Question 2, you calculated the score for 57 miles per gallon as 0.5.

tenth → hundredths

z	0.0	0.01	0.02	0.03	0.04	0.05
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199
0.1	0.5398	0.5433	0.5478	0.5517	0.5557	0.5596
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088

Next, locate the row that represents the ones and tenths place of the *z*-score. For a *z*-score of 0.5, this is the row labeled 0.5. Also locate the column that represents the hundredths place of the *z*-score. For a *z*-score of 0.5, this is the column labeled 0.0. Note that the table represents *z*-scores only to the hundredths place.

Finally, locate the cell that is the intersection of the row and column. The numbers in each cell represent the percent of data values below each *z*-score. For a *z*-score of 0.5, the corresponding cell reads 0.6915.

This means that 69.15% of hybrid cars get less than 57 miles per gallon.

Sep 1-8:17 AM

NOT IN BOOK

Below the Line, Above the Line, and Between the Lines

Z-Scores and Percentiles

1. The birth weights of African lions are normally distributed. The average birth weight of an African lion is 3.6 pounds with a standard deviation of 0.4 pound.

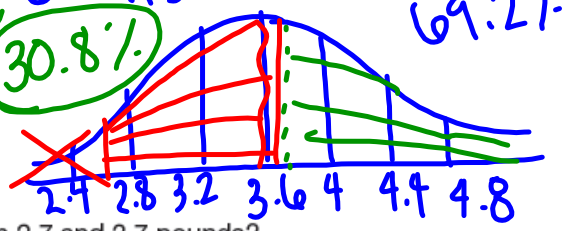
   a. What percent of newborn African lions weigh less than 3 pounds?

   $z = \frac{3-3.6}{0.4} = \frac{-0.6}{0.4} = -1.5$ 0.0668 = 6.68% or 6.7%

   b. What percent of newborn African lions weigh more than 3.8 pounds?

   $z = \frac{3.8-3.6}{0.4} = \frac{0.2}{0.4} = 0.5$ more than 0.6915 = 69.15% or less than 69.2%

   100% − 69.2% = 30.8%

   c. What percent of newborn African lions weigh between 2.7 and 3.7 pounds?

   g. A lioness gives birth to 2 cubs. One cub is in the 47th percentile and 1 is in the 62nd percentile. Determine the difference in the cubs' weights.

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You may have heard someone say, "My baby's weight is in the 90th percentile" or, "My student scored in the 80th percentile in math." What do these phrases mean?

A **percentile** is a data value for which a certain percentage of the data is below the data value in a normal distribution. For example, 90% of the data in a set is below the value at the 90th percentile, and 80% of the data is below the value at the 80th percentile.

The number of text messages teens send and receive every day can be represented as a normal distribution with a mean of 100 text messages per day and a standard deviation of 25 texts per day.

1. Calculate the 50th percentile for this data set. Explain your reasoning.

2. Would a teen in the 90th percentile send and receive more or fewer than 100 text messages per day? Explain your reasoning.

3. Would a teen in the 10th percentile send and receive more or fewer than 100 text messages per day? Explain your reasoning.

4. Use a *z*-score table to determine the 90th percentile for teen text messages.
   a. Determine the percent value in the *z*-score table that is closest to 90%. Explain what information the *z*-score provides.

Sep 3-12:56 PM

Homework

Finish lesson 1.3

Aug 24-2:00 PM